Arctium minus. Burdock. Very common along irrigation ditches.

Centaurea solstitialis. Star Thistle. Occasionally found in West Salt Lake.

Matricaria suavolens. Pineapple Weed. Abundant in waste places.

High School,
Salt Lake City, Utah

FIVE HUNDRED MILES THROUGH THE APPALACHIAN VALLEY

By Roland M. Harper

The shortest railroad route between Washington and New Orleans, namely, via Lynchburg, Bristol and Chattanooga, 1,118 miles, passes for just about half this distance through the Appalachian Valley, which lies at the northwestern base of the Blue Ridge. The route crosses the Blue Ridge and enters the valley (there known as the Shenandoah Valley) a few miles east of Roanoke, Virginia, and passes out of it into the coastal plain at its extreme southwestern end, near Woodstock, Alabama.

The Appalachian Valley is underlaid by much folded and faulted Paleozoic strata, mostly Cambrian, Ordovician and Silurian, varying lithologically from limestone and dolomite to shale and sandstone, and giving rise to a great variety of soils, among which reddish and yellowish clayey loams seem to predominate. It averages about fifty miles wide, and contains many longitudinal ridges, some of these rising to about 2,500 feet above sea-level, but never exceeding in height the mountains bordering the valley. The highest elevations are in Virginia, but the ridges seem to stand out more conspicuously in Alabama, where the intervening valleys are lower. Between Pulaski and Wytheville, Va., at an elevation of about 2,000 feet, the railroad crosses a region of Lower Carboniferous sandstone, with topography and vegetation strongly resembling that of the Cumberland Plateau to the westward; but elsewhere the scenery is

characteristically valley-like, and the topography merely undulating or hilly. (The railroad goes through two tunnels in Montgomery County, Virginia, one in Pulaski County, and one in Hamilton County, Tennessee.)

Rock outcrops are very irregularly distributed along the route, being abundant in some parts and practically wanting in others. In some places, where limestone predominates, the drainage is largely subterranean, and lime-sinks are frequent; but generally there are streams of various sizes in sight. The more level areas are mostly cultivated or pastured, and the hilly and rocky places pastured or wooded. Pastures are more prevalent northward, here as in several other regions.

At daybreak on April 23, 1912, I was just passing Roanoke, Va., going southwestward, and by nightfall, 13½ hours later, I had reached Chattanooga, Tenn., 392 miles away. I remained on the same train as far as Fort Payne, Ala., passing through the northwesternmost county of Georgia for about 25 miles after dark; and the next day I continued my journey by daylight to the southwestern end of the valley and beyond. (The Alabama end of it has recently been described in my geographical report on the economic botany of Alabama.*)

In traveling lengthwise of the valley one does not cross any natural boundaries that have much geographical significance, but in order to bring out some differences in plant distribution due to latitude, etc., the route will be divided arbitrarily into four approximately equal parts.

In the following table the plants identified from the train two or more times between Roanoke and Woodstock are divided into trees, shrubs and herbs, and four numbers are prefixed to each species. The first denotes the number of times the plant was seen between Roanoke and Bristol, 150 miles, the second is for Bristol to Knoxville, 131 miles, the third for Knoxville to Chattanooga, 111 miles, and the fourth for Fort Payne to Woodstock, 120 miles.

For those who may wish to correlate distribution with political boundaries it will be convenient to remember that the first

* Geol. Surv. Ala., Monog. 8: 58–63. June, 1913.

column of numbers pertains entirely to Virginia, the second and third to Tennessee, and the fourth to Alabama.

Species seen only once in 500 miles are not listed, because they are believed to have very little geographical significance. The names of evergreens are printed in bold-face type.

Trees

20	33	22	20	*Cornus florida*	5	0	0	0	**Pinus rigida?**
31	37	12	11	**Juniperus Virginiana**	4	1	0	0	*Ulmus fulva*
0	20	28	25	**Pinus echinata**	1	1	0	2	*Hicoria alba*
31	25	3	0	*Cercis Canadensis*	3	1	0	0	*Quercus coccinea?*
15	12	7	4	**Pinus Virginiana**	0	3	1	0	*Acer saccharinum*
0	0	7	31	**Pinus Taeda**	0	0	0	4	*Quercus stellata*
7	1	7	18	*Salix nigra*	0	0	0	4	*Malus angustifolia*
0	1	6	25	*Liquidambar Styraciflua*	0	0	0	4	*Celtis* sp.
9	7	5	5	*Liriodendron Tulipifera*	0	0	0	4	*Hicoria ovata*
16	1	4	4	*Platanus occidentalis*	2	0	0	1	*Acer Negundo*
9	5	1	8	*Quercus alba*	2	0	0	1	*Fagus grandifolia*
0	0	1	15	*Quercus Phellos*	3	0	0	0	*Acer Saccharum?*
10	4	0	0	**Pinus Strobus**	0	0	0	3	*Quercus nigra*
4	1	5	2	*Acer rubrum*	0	0	0	3	**Pinus palustris**
4	4	1	0	*Aesculus octandra*	2	0	0	0	**Thuya occidentalis**
0	0	0	9	*Quercus Marylandica*	0	0	2	0	*Ulmus Americana?*
8	0	0	0	*Robinia Pseudacacia*	0	0	2	0	*Diospyros Virginiana*
3	2	0	1	*Juglans nigra*	0	0	0	2	*Quercus falcata*
5	1	0	0	*Prunus Americana?*	0	0	0	2	*Fraxinus Americana?*
5	1	0	0	**Tsuga Canadensis**	0	0	0	2	*Quercus pagodaefolia?*
1	3	1	0	*Castanea dentata*					

Shrubs and Vines

3	10	8	2	**Lonicera Japonica**	0	0	0	5	*Aesculus Pavia*
3	3	5	7	*Sassafras variifolium*	0	0	5	0	*Azalea nudiflora*
3	3	5	0	*Rhus glabra*	3	0	0	2	*Alnus rugosa*
0	1	3	4	*Prunus angustifolia*	2	0	0	0	*Salix discolor?*
2	0	1	4	*Sambucus Canadensis*	2	0	0	0	*Rhododendron maximum*
0	2	3	1	*Rhus radicans*					

Herbs

19	9	1	0	*Fragaria Virginica*	4	0	0	0	*Spathyema foetida*
7	11	2	6	*Podophyllum peltatum*	1	1	2	0	*Juncus effusus*
7	9	0	0	*Taraxacum*	3	0	0	0	*Geranium maculatum*
0	0	0	10	*Senecio lobatus*	3	0	0	0	*Aquilegia Canadensis*
4	5	1	0	*Verbascum Thapsus*	3	0	0	0	*Caltha palustris*
0	4	3	3	*Andropogon scoparius*	0	0	0	3	*Ranunculus* sp.
2	1	0	3	*Typha latifolia*	2	0	0	0	*Daucus Carota*
0	0	0	5	*Salvia lyrata*	1	1	0	0	*Arctium* sp.
3	1	0	0	*Brassica* sp.	0	0	1	1	*Pteridium aquilinum*
3	0	1	0	*Verbesina occidentalis*	0	0	0	2	*Rumex crispus*

If the figures for each species in each division of the foregoing list are added together they will form approximately a geometrical progression. Whether there is any explanation for it or not, this seems to be a fundamental property of quantitative analyses of vegetation, as it is of many other kinds of statistics (*e. g.*, the populations of the cities of the United States, arranged in order of size.)

If the trip had been made a few weeks earlier or later *Cornus florida* and *Cercis Canadensis* would have stood considerably lower in the list of trees, because at this time they were in bloom, and therefore very conspicuous. (The fact that *Cercis* was seen 56 times north of Knoxville and only three times south of there indicates that its flowering season was just about at an end in that latitude.) The numbers for most of the oaks would have been higher in summer, for it was difficult to identify them with their leaves only partly developed.

If we add together all the figures for evergreen trees (nine species, all conifers) we find that they make up 39.2 per cent. of the total number of trees; and this estimate is probably not affected much by the season at which the observations were made. Doing the same thing for each column of figures separately, we get 34 per cent. of evergreens for the Virginia portion of the route, 45.1 per cent. for Bristol to Knoxville, 47 per cent. for Knoxville to Chattanooga, and 35.2 per cent. for the Alabama portion. (My estimate for the whole Coosa valley region of Alabama, in the publication above referred to, is 40 per cent.) Just why the percentage of evergreens should be so much higher in the valley of East Tennessee than in the corresponding parts of Virginia and Alabama is not at present obvious. The discrepancy can hardly be due to errors of observation, for the work was done under the same conditions all the way; and it is probably not correlated with any phaenological or climatic factors, because the Tennessee figures do not lie between those for Virginia and Alabama. The fundamental cause is probably in the soil.

The distribution of the following species is of more than passing interest.

Pinus Taeda was first seen a little north of Cleveland, Tenn.,

and the first cotton field was seen a few minutes later. The correlation between the distribution of these two things is remarkably close in some places.

Pinus echinata was first seen about ten miles southwest of Bristol, in Tennessee, but did not become abundant until about fifty miles farther on. It would appear from the map in Mohr's "Timber pines of the southern United States" (U. S. Forestry Bulletin 13) that it extends much farther north in the mountains to the westward than in the Appalachian Valley.

Pinus Strobus, occasional in Virginia, was last seen about 45 miles southwest of Bristol. It barely overlaps *P. echinata*, and on this route does not grow anywhere near *P. Taeda*. One might suppose from the gap between their ranges that there is a climatic barrier between *P. Strobus* and *P. Taeda*, but I have seen them growing side by side at the western base of the Cohutta Mountains in Murray County, Georgia.

Tsuga Canadensis has a distribution and habitat much like that of *Pinus Strobus*, but on this route it was seen only about half as often. Sometimes it was accompanied by *Rhododendron maximum*, especially in the sandstone country near Pulaski, Va.

Thuya occidentalis was seen twice on rocky bluffs in Smyth County, Virginia.

Spathyema foetida was seen a few times in Wythe and Washington Counties, Virginia, and *Caltha palustris* in Wythe and Smyth. I do not remember ever seeing either farther south, although they are supposed to grow in the mountains of North Carolina.

Fagus grandifolia was seen only a few times, and *Betula nigra* not at all.

Phoradendron flavescens was noted only once, that in Greene County, Tennessee.

Liquidambar is rare north of Knoxville, but very common in Alabama.

Fragaria was the commonest weed recognized along the right-of-way in Virginia, and *Lonicera Japonica* in Tennessee.

Acer saccharinum was observed only in Tennessee, along the Holston and Tennessee Rivers.